and the matter so well arranged that the reader has little trouble in finding the discussion of any particular point in which he may be interested. Different readers will doubtless differ as to the relative importance of the several subjects, but it seems on the whole that the balance is well preserved. All workers in plant physiology will find the work practically indispensable. The only source of regret is that so many minor typographical errors should have escaped the proof reader.—B. E. LIVINGSTON.

NOTES FOR STUDENTS.

AMONG THE MOST important ecological investigations of late years are those that have been carried on in New Zealand by COCKAYNE, which have recently brought him the degree of Ph.D., *causa honoris*, from the University of Munich. His most recent publication is an ecological presentation of the flora of the famous "southern islands."[3] COCKAYNE had the privileges of a government steamer, and was able to visit Auckland, Campbell, Antipodes, and Bounty Islands. Although it was necessary to make his studies with "feverish haste," his was the first ecological trip ever made to these islands, and the first botanical trip in winter. These islands lie between lat. 47° 43′ and 54° 44′ S., yet in spite of the high latitude, the larger islands are clothed with a luxuriant rain-forest. Auckland Island (50° 45′) rarely has snow for over three days at a time on the lowlands. Although the rainfall is not excessive, almost every day is rainy or at least cloudy and the evaporation is slight. These features, together with the mild winters, make an ideal rain-forest (hygrophytic) climate. However the winds are constant and violent, a feature which commonly accompanies a xerophytic climate. The resultant vegetation reflects the peculiar climate to a most extraordinary degree. The forest trees are short (not exceeding five meters in height), and present the gnarled aspect so familiar in mountain regions and near the sea. The lateral branches grow to such length as to make the forest a true jungle. Within the forest, where the air and the forest floor are always moist, the wind does not enter; hence the vegetation is amazingly luxuriant, reminding one of the tropical forests; mosses, liverworts, and filmy ferns grow in wild profusion, making a soft carpet, while the trunks of the trees are covered with epiphytes. Even a tree fern (Hemitelia) was discovered, extending by some degrees the record for this ecological type. On Auckland Island there is found a typical hygrophytic forest, though with a xerophytic physiognomy such as just described; Campbell Island has merely a scrub; while Macquarie Island is without either forest or scrub. All of these islands have essentially similar climates, but the smaller islands are too exposed for trees, having instead the tussock formation. The dominant tree of these hygrophytic rata forests is the myrtaceous *Metrosideros lucida*. The much more local forests, in which *Olearia Lyallii* dominates, have a somewhat different aspect. An interesting formation, found also in the Falk-

[3] COCKAYNE, L., A botanical excursion during midwinter to the southern islands of New Zealand. Trans. N. Z. Inst. **36**:225–333. 1904.

land Islands and Fuegia, is known as the tussock meadow; the physiognomy here is chiefly determined by grasses or sedges, which grow on mounds of their own formation, such as are sometimes seen in low sedgy pastures in North America. The tussock formation is scanty on Auckland Island, more extensive on Campbell Island, and almost excludes other formations on the smaller islands. It seems therefore that the forest and tussock form a beautiful instance of vicarious formations. Among the character tussock plants are *Danthonia bromoides* and a species of Poa, the former especially in subalpine tussocks. On Antipodes Island, where the wind is very severe, the tussock often grades off into a xerophytic heath-like formation, where the grasses are less dominant, being replaced by stunted Coprosma bushes, lycopods, and lichens. Some space is devoted to a discussion of the destructive influence of animals, which is especially marked in the sheep pastures of Campbell Island. COCKAYNE is a firm believer in the presence of a former land connection between New Zealand and these islands, because it is impossible otherwise to account for the presence of entire New Zealand formations. Certain species might be transported hundreds of miles, but scarcely the constituents of an entire formation.

In an earlier paper,[4] COCKAYNE has given an admirable picture of the vegetation of Chatham Island, 450 miles to the east of New Zealand. The climate resembles that of the southern islands, but is of course much milder. As would be expected, the climatic formation of the island is the hygrophytic forest, which presents a somewhat xerophytic physiognomy, though much less so than on Auckland Island. The trees commonly come close to the sea. Palms are frequent, and tree ferns are among the dominant elements, especially species of Dicksonia and Cyathea. Perhaps the dominant tree is the celastrineous Corynocarpus. COCKAYNE made a genetic study of the dune and bog floras. On the beach the dominant plant was once the handsome *Myosotidium nobile*, the only endemic genus of the island, now almost extinct in its native state. The dunes, once established, have been artificially disturbed, and hence show various phases of movement. In the virgin state the dunes were even forested with Olearia and Myrsine. A careful study was made of the dynamics of the bog floras, and one may find many striking parallels between these antipodean bogs and those of the United States. Sphagnum plays a dominant part in the early stages, but of much greater interest is the fact that the succeeding shrub stages are dominated, just as here, by shrubs of the most pronounced xerophytic structure; of course these shrubs have little or no floristic relationship with those of our bogs. Among the chief character shrubs are the ericaceous Dracophyllum, the restionaceous Leptocarpus, and the rubiaceous Coprosma. Carex is also conspicuous in the early stages. The first tree is the composite, Olearia. Then comes the typical forest, as described above. On the table land, *Senecio Huntii* (also an arborescent composite) and *Dracophyllum arboreum* dominate the early forest stage. Many

[4] COCKAYNE, L., A short account of the plant-covering of Chatham Island. Trans. N. Z. Inst. **34**:243–325. 1902.

of the characteristic bog plants are just as characteristic of dry as of wet xerophytic situations; this is true of Olearia, and notably so of *Phormium tenax*, the New Zealand flax. This plant, once so abundant, is being exterminated by fires and grazing animals, and is now almost confined to the seemingly opposite habitats rocks and lake margins. Fires have wrought great destruction to the native flora and as a result there are vast areas dominated by the typical fireweed, *Pteris esculenta;* the exotic *Rubus fruticosus* also covers large areas.

DENDY[5] has also written concerning the flora of Chatham Island. He thinks that the absence of many characteristic New Zealand types is due to the absence of many typical New Zealand habitats, such as alpine and other xerophytic situations, as well as to the long time that has elapsed since the islands were connected with New Zealand; even when there was a land connection, it is likely that much of it was a desert, and hence a barrier to many forms.

An earlier paper by COCKAYNE[6] deals with the vegetation of the New Zealand mainland, in the neighborhood of the Waimakariri River. In this paper there are brought out the characteristic features of the eastern and western climatic regions, and their various edaphic formations.—H. C. COWLES.

THE PREMATURE decease of NICOLAS ALBOFF has been much mourned by plant geographers. His studies in Fuegia have been edited and issued by EUGÈNE AUTRAN,[7] who has published as a preface an appreciative biographical sketch, together with a bibliography and an excellent portrait. In the historical summary, especial praise is given to the work of HOOKER more than half a century ago. There are two dominant formations, the forest and the moor. The forests are extremely dense and luxuriant, and bear witness to the humidity and uniformity of the climate. The forest floor has a wealth of bryophytes and filmy ferns. Extreme floristic poverty characterizes these forests, only two tree species being present: *Fagus antarctica* and *F. betuloides*. Moors occur where the forest cannot exist, either through exposure or soil moisture. Kerguelen Island, 140° distant, represents, from a floristic standpoint, the farthest point reached by this Fuegian flora. The balsam bogs or dry moors, so characteristic of the Falkland Islands, are also found in Fuegia. Fifty-three per cent. of the species are endemic. The most interesting elements in the flora are the neozelandian and boreal. ALBOFF agrees with most authors in holding to an ancient antarctic continent or archipelago, as accounting for the similar floras throughout antarctic regions. The long-known and most perplexingly large boreal element has been a stumbling

5 DENDY, A., The Chatham Islands; a study in biology. Manchester Memoirs **46**:1–29. 1902 See Bot. Cent. **89**:728–729. 1902.

6 COCKAYNE, L., A sketch of the plant geography of the Waimakariri River Basin, considered chiefly from an oecological point of view. Trans. N. Z. Inst. **32**:95–136. 1900.

7 ALBOFF, NICOLAS, Essai de flore raisonnée de la Terre de Feu. Anales del Museo de La Plata. Sección Botanica. I. pp. vi+85+xxiii. With portrait. La Plata. 1902.

block to students of floristics. Apart from species that are more or less cosmopolitan, the author holds that alternating glacial climates, advocated by CROLL, afford the best explanation for the similarity of austral and boreal floras. Since glacialists generally reject CROLL'S hypothesis, it is seen how slender a support ALBOFF'S theory has. To the reviewer, it seems that here, if anywhere, we shall be forced to consider, at least as a possibility, BRIQUET'S polytopic (polygenetic) theory.

In connection with the work of ALBOFF, brief mention may be made of DUSÉN'S admirable studies in the same region. DUSÉN'S earlier work has been noted in these pages.[8] One of his papers[9] was for the most part a floristic and taxonomic account of the flora. A later paper[10] presented a more detailed ecological account of the vegetation, along the line of the short earlier articles. His latest paper[11] gives an excellent account of the ecological and floristic features of western Patagonia. There are three great regions: the evergreen forest, the deciduous forest, and the steppe. The evergreen forest resembles that described by ALBOFF, and for New Zealand by COCKAYNE. Bryophytes, especially liverworts, form a forest floor, sometimes five or six feet thick. Epiphytes reach a high degree of development. One or more species of beech everywhere dominate, although *Drimys Winteri* and *Libocedrus tetragona* are often abundant, the latter especially in moory soil. Of extraordinary interest is the deciduous forest, the only one yet found in the southern temperate zone. The dominant tree is *Fagus* (*Nothofagus*) *antarctica*, the very tree that dominates so much of the evergreen forest. Very few cases are known, at least on the lowlands, where one tree species dominates in two radically different climatic forest types. The whole forest aspect differs, being more parklike, and without the luxuriant undergrowth of the evergreen forests. The rich bryophyte carpet of the latter is wholly missing. The steppes call for no special mention. Through the work of ALBOFF and DUSÉN, it is clearly to be seen that the Fuegian and Patagonian vegetation is of almost equal interest to the ecologist as the vegetation of New Zealand.—H. C. COWLES.

ITEMS OF TAXONOMIC INTEREST are as follows: J. RICK (Ann. Mycologici **2**:407. 1904) has described *Pseudohydnum* as a new genus of fleshy fungi from South America.—A new part of KOMAROV'S *Flora Manshuriae* (Acta Hort.

[8] See BOT. GAZ. **24**:135. 1897. Also Engl. Bot. Jahrb. **24**:179–196. 1898.

[9] DUSÉN, P., Die Gefässpflanzen der Magellansländer, nebst einem Beitrage zur Flora der Ostküste von Patagonien. Svenska Expeditionen till Magellansländerna. 1900. See Bot. Cent. **85**:47–49. 1901.

[10] DUSÉN, P., Die Pflanzenvereine der Magellansländer, nebst einem Beitrag zur Oekologie der magellanischen Vegetation. Svenska Expeditionen till Magellansländerna **3**:351–523. 1903. See Bot. Cent. **96**:468–469. 1904. Also Engl. Bot. Jahrb. **33**:litt.28–29. 1903.

[11] DUSÉN, P., The vegetation of western Patagonia. Reports of the Princeton University Expeditions to Patagonia, 1896–1899. Part I. Princeton. 1903.

Petrop. **22**:453–787. *pls. 1–17.* 1904) begins with Rosaceae and ends with Balsaminaceae, bringing the serial numbers of species to 1058.—P. A. RYDBERG (Bull. Torr. Bot. Club **31**:555–575. 1904), in his 12th paper entitled "Studies on the Rocky mountain flora," has described new species of Draba, Smelowskia, Sophia (2), Arabis (2), Erysimum (2), Opulaster (2), Holodiscus, Potentilla, Rosa (2), Astragalus (2), Homalobus (3), Ceanothus, Sphaeralcea (2), Touterea (2), Acrolasia (2), Epilobium (4), Gayophytum, Anogra (2), Pachylophus (2), Gaura, Suida, Aletes, Phellopterus, and Pseudocymopterus.—H. A. GLEASON (Ohio Nat. **5**:214. 1904) has published a new Helianthus from Illinois.—H. REHM (Hedwigia **44**:1–13. *pl. 1.* 1904) has published *Trichophyma* (Myriangiales) and *Stictoclypeolum* (Mollisiaceae) as new South American genera of fungi from the Ule collection.—H. CHRIST (Bull. Herb. Boiss. II. **4**:10 9–1104. 1904) has described new species of Costa Rican ferns under Asplenium (2), Lomaria (3), Adiantum (3), Gymnogramme (2), Saccoloma, and Polypodium (3).—G. HIERONYMUS (Bot. Jahrb. **34**:417–560. 1904) has published Lehmann's pteridophytes from Guatemala, Colombia, and Ecuador, enumerating 315 numbers, and describing new species in Trichomanes (2), Hymenophyllum (2), Loxsomopsis, Cyathea, Nephrodium (6), Aspidium, Polystichum, Diplazium (2), Blechnum, Gymnogramme (5), Adiantum, Polypodium (12), and Elaphoglossum (7).—E. L. GREENE (Leaflets **1**:65–81. 1904) has described 5 new species of Ceanothus; has separated from Gentiana the genus *Pneumonanthe*, to include the "closed gentians" and their allies, and has transferred to it nearly 30 species; and has described from middle California new species under Lupinus (4), Lotus, Sidalcea (2), Silene, Aquilegia, Delphinium, Bistorta, Eriogonum, Swertia, Castilleia (2), Pentstemon, Apocynum, Cryptanthe, Galium, and Chrysothamnus (2).—R. M. HARPER (Torreya **4**:161–164. 1904) has recognized a new species of Ludwigia (*L. maritima*) among the forms commonly referred to *L. virgata.*—C. F. MILLSPAUGH (*idem* 172) has published a new species of Euphorbia from the Bahamas.—W. H. BLANCHARD (Rhodora **6**:223–225. 1904) has described a new Rubus (blackberry) from New England.—H. D. HOUSE (*idem.* 226 *pl. 59.*) has described a new Viola from New England.—J. M. C.

WIELAND[12] has secured transverse seed-sections of one of the Bennettitales showing tissue filling the archegonium, which he interprets as the proembryo. If he is correct, this is an interesting confirmation of the current morphological view that the Ginkgo type of proembryo is the most primitive among living gymnosperms. The previously known mature seeds of Bennettitales are singular among gymnosperms in the entire absence of endosperm; and now even in this reported proembryonic stage WIELAND finds no trace of endosperm.—J. M. C.

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[12] WIELAND, G. R., The proembryo of the Bennettiteae. Am. Jour. Sci. IV. **18**:445–447. *pl. 20.* 1904.